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ABSTRACT

As the preschool and early years of schooling were becoming the focus of increasing attention, the Scottish Office Education and Industry Department commissioned a review of United Kingdom and international literature on the use of early intervention schemes for disadvantaged students. The resulting review presents evidence on the most appropriate time to intervene, the effectiveness of alternative strategies, and reported long-term benefits. The strong message from the research is that there are no single-measure answers. Early intervention schemes should be located within the wider framework of efforts over the last 2 decades to overcome educational disadvantage and improve school performance. Children's needs are no longer seen as separable from family needs. Research on early learning closely links cognitive development to social and emotional factors, and policy makers and practitioners will need to taking this into consideration as they put practical initiatives into place. (Contains 23 references.) (HTH)

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TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

Foreword

'I am pleased to be able to provide this foreword to the 50th edition of Interchange. The Interchange series plays a valuable role in disseminating research findings on a wide range of topics to everyone with an interest in developing education in Scotland.

I especially welcome this 50th edition which looks at the available evidence on the benefits of early intervention in assisting pupils to attain basic literacy skills. Research suggests that effort expended on early intervention in the early years of primary — and indeed at the pre-school stage — can play a critical role in helping children to attain quickly basic literacy and numeracy skills. There is consistent agreement that skills and habits acquired in the early years of primary school have a lasting impact on subsequent achievement.

The Government places a high priority on ensuring that education authorities have the necessary support to implement early intervention policies.

I was delighted therefore to be able to announce in June 1997 a £24 million Early Intervention Grants Programme. This will assist every local authority in Scotland to implement a basic literacy and numeracy strategy in the early years of primary school. The aim of the programme is to support teachers and to ensure the appropriate skills and resources are available in the classroom to enable pupils to gain the essential literacy and numeracy skills which are the key to accessing all later stages of curriculum.

Much hard work remains to be done but the Government is committed to supporting pupils, parents, teachers and education authorities as they work in partnership to attain the standards that our children deserve.'

Brian Wilson, MP

Secretary of State for Education and Industry

January 1998

Early Intervention: Key issues from research

Helen Fraser

Moray House Institute of Education

The Scottish Office Education and Industry Department commissioned this review of the UK and international literature on the use of early intervention schemes. The pre-school and early years of schooling were becoming the focus of increasing attention and a review of existing literature was required. It presents evidence on the most appropriate time to intervene, the effectiveness of alternative strategies and reported longer-term benefits.

The strong message from the research is that there are no single-measure answers. Early intervention schemes should be located within the wider framework of efforts over the last two decades to overcome educational disadvantage and improve school performance.

Children's needs are no longer seen as separable from family needs. Research on early learning closely links cognitive development to social and emotional factors and policy makers and practitioners will have to take this into consideration as they put practical initiatives into place.

Intervening in educational disadvantage in Scotland

A comprehensive intervention strategy to strengthen education in the early school years was strongly recommended by the 1996 Task Force report to the Secretary of State for Scotland, *Improving Achievements in Scottish Schools*. The report advocates programmes of planned intervention for pupils in nursery and Primary 1-3, with a particular emphasis on overcoming the 'disadvantages and inequalities of social and domestic background'.

Using evidence from a number of Scottish intervention initiatives, Nisbet and Watt (1994) argue that the links between poverty and educational disadvantage are very strong and very difficult to break. The belief that education is key to change and equality of opportunity has been central to the positive discrimination policies of Regional Authorities over the last twenty years. But 'inspirational' initiatives have gradually given way to the more 'realistic', perhaps as a consequence of a much deeper analysis and shift of attitude about society and its perspectives. The more complex picture widens beyond social conditions to encompass all aspects of social exclusion including gender, race and disability, and more fundamentally to the right of all human beings to dignity and respect.

Researchers (Nisbet and Watt, 1994) identify three general strategies across Scotland: investing more resources, developing new approaches and working to change attitudes. Outstanding in the broad spectrum of initiatives has been the well-established Urban Programme, the main route for central funding to local projects. The Urban Programme now encourages local groups and initiatives and as a result changes the relationship with professionals which may have implications for the teaching profession. There may be the beginning of positive change but as Nisbet and Watt point out 'the problem of educational disadvantage linked with poverty remains stubbornly resistant'. What has been learned, they suggest, is the need to acknowledge the complexity of the problem by combining three strategies for action:

- invest more resources such as money, facilities, staff
- develop new approaches in home-school links, local action and cooperating with other agencies
- work to change attitudes, ethos and climate.

The complexity of factors affecting educational attainment continues to

interest Scottish researchers. Garner and Raudenbush (1991), using a technique known as multi-level modelling, claim that the effects of neighbourhood deprivation are additional to effects from individual and family background influences, and are significant. They warn against proposals from Mortimore *et al* (1988) that the wider socio-economic structure in which schools are situated should be ignored. The complexity of the relationship between socio-economic status and educational attainment is being more explicitly described by this kind of analysis but, as Paterson (1991) points out, there is still some way to go in understanding the relationship before practical ways of overcoming its harmful effects can be confidently developed.

Effectiveness and improvement in disadvantaged areas

Do schools make a difference? The question has increasingly exercised researchers and H.M. Inspectorate in the last decade. The perspective has once again become more optimistic. Earlier interpretations of research evidence in the US left a legacy of disappointment. Intervention programmes seemed to make little difference to pupil attainment because of the apparently over-riding importance of home factors. Research in Britain seemed to confirm this very depressing view.

Re-analysis of the evidence with new approaches to designing methodologies for studying and comparing individual schools have turned the debate to more positive possibilities. A number of reviews confirm that:

- schools can— some against the odds— make a difference
- quality of teaching and learning is a decisive factor
- leadership and management of change are important.

The quality of teaching and learning in classrooms is a decisive factor in raising achievement.

What are the implications for initial and inservice teacher education?

However the link between educational performance and disadvantage has so far resisted attempts to break it (Hillman, 1996). Disadvantage seems to survive from generation to generation. Effective schools are not effective for all children. The link between school effectiveness and school improvement is complex and research needs to continue. Different political positions on comprehensive education add another layer of complexity to the debate in the secondary sector, but Mortimore (1991), referring to the primary sector identified conditions which appear to promote successful school improvement programmes:

- most staff and headteachers agree on a clear mission
- a systematic audit of current strengths and weaknesses is carried out
- a change plan is thoroughly thought through
- an outside agent is involved
- implementation of the change plan is supported by all appropriate external authorities
- an evaluation is used formatively to support the implementation.

How teachers are involved seems to be crucial. As Stoll (1991) puts it:

> Ultimately, the key to success of any school improvement or change effort lies in the involvement of and respect for the

> opinions of those who have the final responsibility to make it work, namely the teachers.

This view is echoed by others. (Hopkins, 1991; Maden & Hillman, 1996). Strong leadership is not enough. There needs to be a combined intention to set a process in motion and achieve a goal. Such active engagement can generate its own momentum:

> ... imparting back to them an enthusiasm and commitment that perhaps many of those involved did not know they possessed. (Maden and Hillman 1996).

Timing of early intervention

The research evidence in general favours early intervention over later remediation. If children are identified and intervention begins in the first or second year at school there seems to be a greater chance of success than is achieved by programmes designed for older pupils. Preventing later reading problems seems to be easier than dealing with them once established.

American researchers (Slavin *et al*, 1992), summarising a major federally-funded review of early intervention projects, put emphasis on actual school success or failure in reporting the outcomes of diverse projects. Their criteria for success were reading performance and the incidence of retention and placement in special education. They also emphasised long-term effects, finding that:

- early intervention is expensive—but so is later provision
- early success in school does not guarantee later success but early failure virtually guarantees later failure
- pre-school experience seems to have little effect on elementary reading performance
- pre-school experience should be part of a comprehensive approach to prevention and early intervention
- class size reduction when applied as the *only* strategy has established few effects, but may have impact if the class is reduced to 15
- classroom assistants can be effective if used for the provision of one-to-one tutoring of at-risk first-graders (6-7 year-olds)
- mixed and comprehensive strategies are more effective than single strand approaches
- one-to-one tutoring of first-graders is by far the most effective way of preventing early reading failure, especially when teachers are the tutors (as in Reading Recovery)
- addressing quality of curriculum and instruction must be included in any intervention.

Although a comprehensive approach should include children from the pre-school stage, involving at-risk 6-7 year-olds in skilled one-to-one tutoring is particularly effective.

Is there enough emphasis in schools on Primary 2 children in the learning to read process?

The *Success for All* programme, which began in Baltimore in 1987 and spread to about 300 schools across the States, demonstrated a number of elements which characterise successful intervention:

- high quality pre-school provision
- research-based curriculum and instructional methods from pre-

school to later stages

- reduced class sizes
- positive relationships and involvement with parents
- one-to-one tutoring in reading from teachers for those falling behind in the first grade
- family support programmes.

In Britain, a reluctance to intervene early has been based on the belief that children with real reading problems cannot be identified early (Sylva and Hurry, 1995). However this position seems no longer tenable. It is possible to discriminate between the attainment in reading of children of five or six years using a variety of methods: word and text reading and writing, assessment tasks on letter recognition, concepts of print (print carries a message, we read from left to right, the difference between a word and a letter etc.) and phonological awareness.

Research into the effectiveness of reading intervention at the nursery stage is still inconclusive. For a small minority of the young children general phonological training in rhyme awareness at the nursery stage may not be as effective as more individualised specialist support.

Work at the University of Birmingham (Layton *et al* 1996) looked at the longitudinal effects of even earlier reading intervention which promotes phonological awareness in the nursery class. Results to date show that advice and activity ideas can be incorporated relatively easily into pre-school routines but early findings suggest that such activities may be insufficient to train rhyme awareness in a small minority of young children. A programme may need to consider more closely individual differences amongst such children. The more individualised use of the materials by professional speech/language therapists led to greater improvement.

Reading Recovery

Reading Recovery is one of the best known and most documented examples of early intervention in reading (Clay, 1985). It was developed in New Zealand and targeted the 20% lowest performing children in a class after one year of schooling. The intensive and highly specific programme was congruent with the formal and carefully staged New Zealand policy of teaching reading. This may explain the programme's more pronounced success in New Zealand.
Reading Recovery aims to help individual children develop, correct and become more aware of the reading strategies they are using. Typically, a daily 30 minute tutoring session includes:

- rereading two or more familiar books
- rereading yesterday's new book and taking a running record (to determine error rate and strategies)
- letter identification (plastic letters on a magnet board) and/or words and word-making and breaking
- writing a story
- cut-up story to be arranged
- new book introduced
- new book attempted.

Children receive half an hour of instruction daily for 12 to 20 weeks which ends when they can cope with classwork without extra support.

Training teachers to deliver the programme is crucial to success. This usually lasts a year and includes guided practice. Some research (Pinnell *et al.* 1994) found that if training was shortened the programme ceased to be effective. Comparing the effectiveness of several other kinds of intervention as well, the researchers concluded that one-to-one instruction is essential for the lowest achievers but is not enough in itself to explain the success of Reading Recovery. Nor are time and materials sufficient ingredients of success. The crucial aspect seems to be that longer training ensures that teachers can make individualised, spontaneous, effective decisions. Feedback and prompting were notably better in longer-trained teachers. The key ingredients of training are:

- presentation of theory
- demonstration of skills or models of teaching
- practice in simulated or classroom settings
- open-ended feedback, and coaching.

This mirrors early findings on the effects of phonological awareness on later literacy attainment (Layton *et al.* 1996). Effective, and creative, individualised tutor-reaction is likely to be a significant component of any practical teaching strategy, particularly for the lowest achievers. Mutual support after training is also important (Pinnell et al. 1994). Peer support, group discussion and time to reflect may enhance training significantly.

The crucial aspect of the success of Reading Recovery appears to be the longer training of the teachers and the continuing peer support which results in the ability to make individualised, spontaneous and effective decisions.

Although Reading Recovery has been found to be effective, some researchers raise doubts. Clay herself (1985) claimed the programme was effective only when there was change on four fronts:

- behavioural change on the part of teachers
- child behaviour change achieved by teaching
- organisational changes in schools
- social / political changes in financing by controlling authorities.

This implies that no programme will succeed unless it is embedded in a wider context of effective change.

How can teachers work together to continue to deepen and refine their expertise?

From evaluative evidence in several countries, there seems no doubt that low-achieving readers make significant gains from intensive one-to-one programmes. But criticism of Reading Recovery persists. Studies question:

- whether similar results could be replicated on tests other than the Clay Diagnostic Tests
- the methodology of the statistical analysis—there is clear potential for bias when only those children who completed the programme and successfully discontinued were included in the result
- that children were not assigned to control and experimental groups randomly — particularly problematic when the experimental groups were the lowest achievers.

However, other studies indicate that early gains from Reading Recovery may not be maintained. One reason for this decline may be the lack of articulation

between the Reading Recovery and normal classroom reading curriculum. Programmes are effective although not for every child as there are other appropriate interventions. Nor does Reading Recovery do away with all later needs for specialist support or the development of metalinguistic skills.

Reading Recovery and phonological intervention compared

A major study in England (Sylva & Hurry, 1995), evaluated two different interventions, Reading Recovery and a less intensive programme, Phonological Intervention (Bradley, 1984). Children with reading difficulties were allocated to one of the two programmes and their progress compared with approximately 200 'control' children following normal school curriculum.

Both groups made significantly better progress on various aspects of reading and writing compared with the control groups. Effects were still apparent a year after intervention. However, there were differences. The evaluators concluded that the more expensive Reading Recovery produced larger gains over a wider range of skills than did Phonological Intervention which showed gains over time in reading accuracy, spelling and phonological skills, but not in reading comprehension. This lack of effect on reading comprehension has been found by other evaluations of programmes which are mainly phonics-based. Sylva and Hurry (1995) point out that 'interventions with a narrow model of reading tend to have a narrower effect'. Reading Recovery was particularly effective with the least able readers and those taking free school meals.

'Interventions with a narrow model of reading tend to have a narrower effect'. (Sylva and Hurry 1995).

Paired reading

Paired reading, a strong feature of reading teaching in the 1980s, still continues in many schools. Initially, not so much an early intervention programme as a remedial one, it became a relatively standard practice in many Scottish schools. In the central study, the well-documented Kirklees Project, teachers were trained practically in the technique until it was mastered. Most but not all tutors were parents. Home visits were a feature in about one quarter of the projects.

Results (measured by tests) vary considerably but paired reading consistently produces greater confidence and fluency, as well as greater use of context and of self-correction. Children display better phonic skills and greater reading accuracy. Acceleration can be sustained and there appear to be long-term changes in reading style. Improvement in behaviour at home and in school was frequently reported, although there was no measure for this.

There are still research questions to be answered but Topping and Lindsay (1992) point out that when delivered within a well-organised service context, paired reading satisfies most of the appropriate criteria. They agree that community interventions should be:

- simple and inexpensive
- effective and sustainable
- flexible and decentralised
- compatible with existing values and needs of the population.

Parents and families

Work involving parents has developed further. Some studies show good results regarding the response of parents, but there are doubts about the degree of measurable gain of working class children (Hannon, 1991). Any gain is minimal — no more than one or two months of reading age. In contrast, the Haringey Project used parental help over two years to help 6-8 year-olds with their reading. Three years after the project finished (Hewison, 1988) results show that the children involved in the exercise became, and remained, better readers.

Family literacy projects are a more recent feature. They focus on work with parents rather than directly with children. Evaluative evidence (Topping and Wolfendale, 1995) is still very varied. The lesson so far for schools is to be aware of the difference between intervention and interference.

John Raven (1980) made a similar point following evaluation of the Lothian Region Educational Home Visiting Scheme. Trained teachers visited the homes of two and three year-olds for one hour per week over nine months. Raven, giving due credit to the scheme, warned that such interference might have wider consequences.

> Far from leading them to be better mothers and better able to help their children develop competencies valuable to themselves and society the EHVs may have led mothers to adopt perceptions, expectations and behaviours which are psychologically damaging to themselves, which inhibit the growth of their children and which are dysfunctional in society.

There does seem to be a growing awareness that parental involvement schemes must value the home culture and be in tune with families' own purposes.

Working with parents does seem to offer the possibility of worthwhile gains for children but it is important to be aware of the difference between intervention and interference.

How can schools develop a closer educational relationship with parents which values the home culture?

The Pilton Project

The Pilton Project began in the session 1992-3 with a very strong report from local authority school psychologists on the low levels of literacy in an area of the City of Edinburgh (McMillan, Fox and Wood, 1993). Findings showed there were seriously low levels of reading attainment, not enough classroom time spent on reading, behaviour problems and a low level of parental support. The report recommended:

- more time on language in the early years
- attainment targets set at a realistic level to enable 'almost all' pupils to succeed by end of P3
- parental involvement
- phonological training and other reading-related skills at the pre-school stage
- a systematic approach to the teaching of phonic skills and to ensure regular reading at an appropriate level of difficulty
- an intensive early intervention scheme for vulnerable P2 pupils

- full access to learning support for all pupils according to degree of difficulty with reading
- the appointment of nursery nurses for use in infant classes
- a coordinated reading policy, including joint discussions with headteachers, advisory staff, support services and psychologists
- reduction of class size in P1-3 in areas of deprivation.

The initiative, costing £204,000, put just such a battery of measures in place. From 1994-6 Lothian Region Education Committee funded the appointment of two home-link teachers to the four schools, 1.6 FTE learning support teachers and 6 nursery nurses. Additional learning support was dedicated to a rolling programme of Reading Recovery in P2. This adapted the Reading Recovery programme but involved only a very short training for experienced learning support teachers. A psychologist, seconded for two days a week, provided a programme of in-service together with a Regional Language Development Officer.

Teachers in nursery classes attached to schools, were encouraged to hear children read daily, develop their awareness of the sounds in spoken language and their attempts at early writing. At P1, P2 and P3; concepts of print were specifically taught, each child's reading was heard daily and children were to be given the opportunity to write from the earliest stages. Sight vocabulary was progressively taught from lists of the most common words. Simultaneous oral spelling was also recommended.

The time spent by children on reading is linked to achievement.

The Pilton initiative included the mixed and comprehensive strategies generally equated with effectiveness, but this posed a problem for evaluation. With so many new elements, evaluation could not rigorously separate out the relative significance of any one of the variables. Quantitative evaluations (McMillan, 1996) reported reading achievement scores, while qualitative evaluations (Fraser, 1996) provided illuminative evidence.

What are the organisational and resource implications of allocating extra time for beginning readers and particularly for those at risk?

Progress was dramatic. In Primary 2, alone, the proportion of virtual non-readers dropped from 33% in the 1994 baseline measures to 13% in 1996. Approximately 31% of pupils reading at average levels or above in 1994 increased to 52% by 1996. Those reading above the average increased from 19% in 1994 to 45% in 1996. (McMillan, 1996). The time given by teachers to children's reading rose by 400% (Fraser, 1996), with extra time given by the classroom assistant nursery nurses and the learning support teachers. Time given to independent writing, however, was disappointing.

MacMillan (1996) did however note a 'teacher effect' in children's progress. There were patterns in the results which could only be put down to differences in teacher effectiveness. Classroom observations in the evaluation supported this conclusion. Teachers and headteachers alike considered the most effective aspects of the project to be the contribution of the nursery nurse classroom assistants, the Reading Recovery programme and the work done by home-link teachers with parents.

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Children's behaviour and attitudes to learning generally improved. Headteachers acknowledged however (Fraser, 1996) that children with particular difficulties made limited, or in some cases non-existent, progress. Classroom observation identified poor attendance and persistent lateness as significant factors for some children. Headteachers recommended overall that intervention should:

- be a whole-school initiative
- target resources to the early stages
- increase curriculum time spent on reading through, extra staffing, class ratios and allocating 20% 'flexibility factor' to language
- link with the family and the community
- share good practice, in school, and with home.

It is worth noting that more recent work (Leslie & Fraser, 1996) in another Edinburgh suburb (Craigmillar) indicates that staff development had moved on since the Pilton Project with more emphasis now being placed upon supporting emergent and independent writing. Early results are very encouraging.

The evidence on numeracy

Most of the research findings discussed so far have focused upon literacy: this is a reflection of the paucity of evidence on developing numeracy skills. One exception is the National Numeracy Project in England which was established in 1996 to raise standards of numeracy in primary schools. The five-year project is coordinated by Anita Straker, who has overseen development of numeracy centres in 12 local authorities. It aims to develop a defined and detailed basic content. Training is a key aspect of the initiative.

Locating numeracy more firmly in reasoning and language seems to be the message from research.

What implications does this have for teaching and learning approaches at the early stages?

Research emphasises the need to locate numeracy more firmly in the domains of thinking, mental reasoning and language than do present approaches in the UK. Bierhoff (1996) suggests that the low priority given to mental calculation is one of the features which differentiate British textbooks from German and Swiss counterparts. Continental countries put more emphasis on:

- mental arithmetic to promote conceptualisation of number and 'extended chains of reasoning'
- teaching two-digit numbers as single concepts and less emphasis on dissecting according to place-value
- more thorough introduction to the number range 20 to 100 with more overview exercises on the full range of those numbers
- more support for developing optimal mental calculation strategies with earlier discontinuation of counting one-to-one on concrete material, a strategy which is seen to inhibit the development of mental calculation
- delaying the introduction of pocket calculators
- more consolidation and more continuous time given to each topic before moving on
- a more distinct sense of progression in the development from easier to more difficult concepts.

The importance of verbal interactions between teacher and pupils and pupils and pupils in developing mental skills is highlighted. In Germany and Switzerland talk played a much stronger role in the development of concepts than it does in Britain. Scottish research with much younger children similarly stresses the importance of interaction in early learning in both literacy and numeracy. Munn and Schaffer (1993) explored the experiences of 2 and 3 year-old children in local authority nurseries in Scotland. Their findings suggest that:

- one-to-one adult-child interaction should be maximised, preferably by assigning children to particular adults
- special attention should be given to early numeracy experiences so that staff understand the role of language and social interaction in early development.

Conclusions

This review, like all such reports, is based upon a selection of published research. However from the literature surveyed, the main findings are clear: there is no single-answer measure to under-achievement. Successful early interventions take account of a number of factors including:

- siting interventions within the broader concept of equal opportunities for all
- recognising that disadvantage linked to socio-economic deprivation is very resistant to change
- designing a mixed and comprehensive strategy
- intervening early, preferably with six-year old children
- ensuring that appropriate staff development is offered to teachers
- increasing verbal interactions between teacher and pupil and pupils and pupils
- making contact with parents and outside agencies to form a broad strategy of intervention.

Full report

Copies of the full review may be downloaded from the RIU website at http://www.hmis.scotoff.gov.uk/riu

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The views expressed in this paper are those of the author and do not necessarily reflect those of The Scottish Office Education and Industry Department who funded the study.

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Further information

If you have views on ***Interchange*** and/or wish to find out more about RIU's research programme, contact the Research and Intelligence Unit (RIU), The Scottish Office Education and Industry Department, Room 2B, Victoria Quay, Edinburgh EH6 6QQ

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